

Figure 1

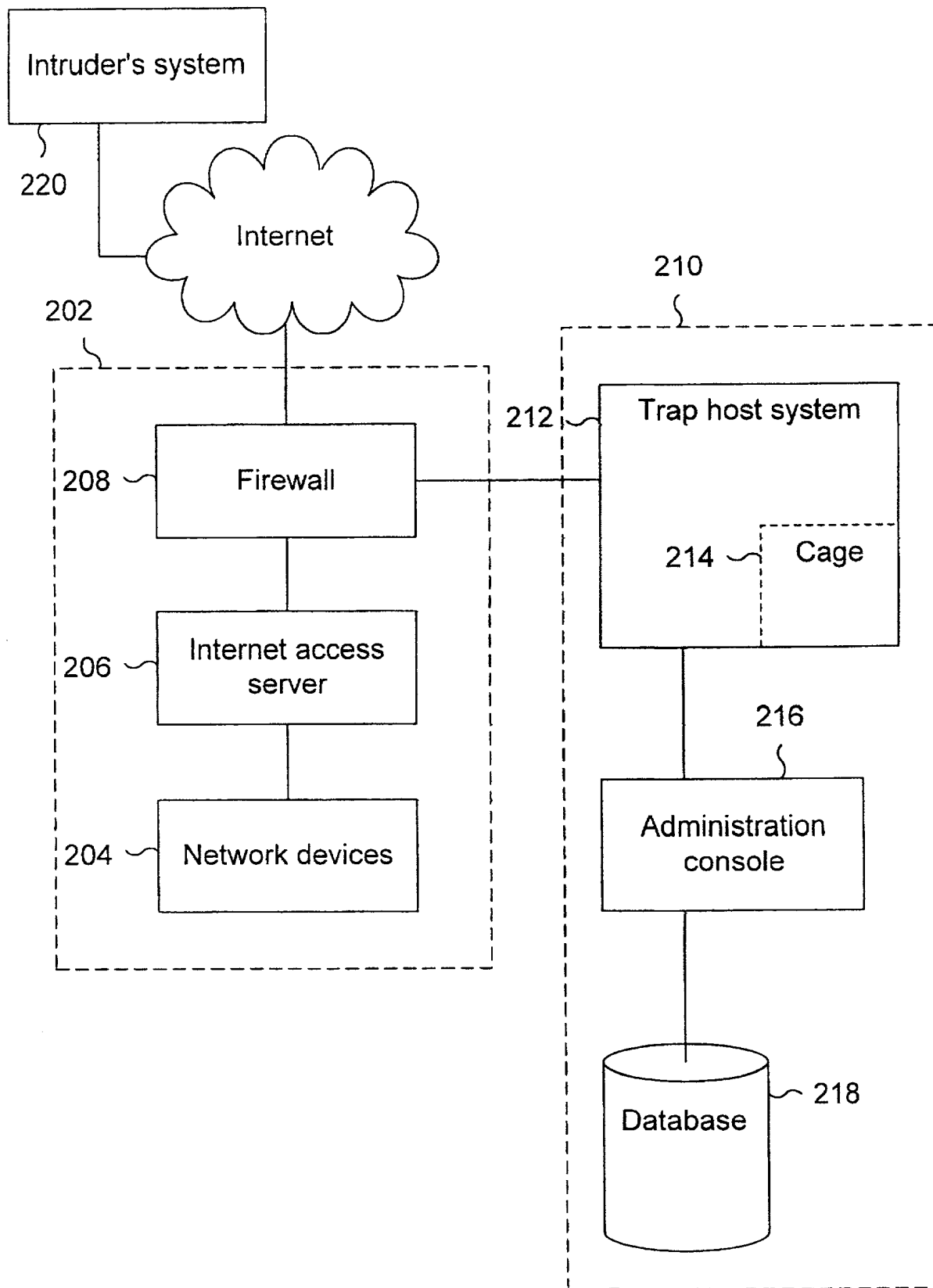


Figure 2

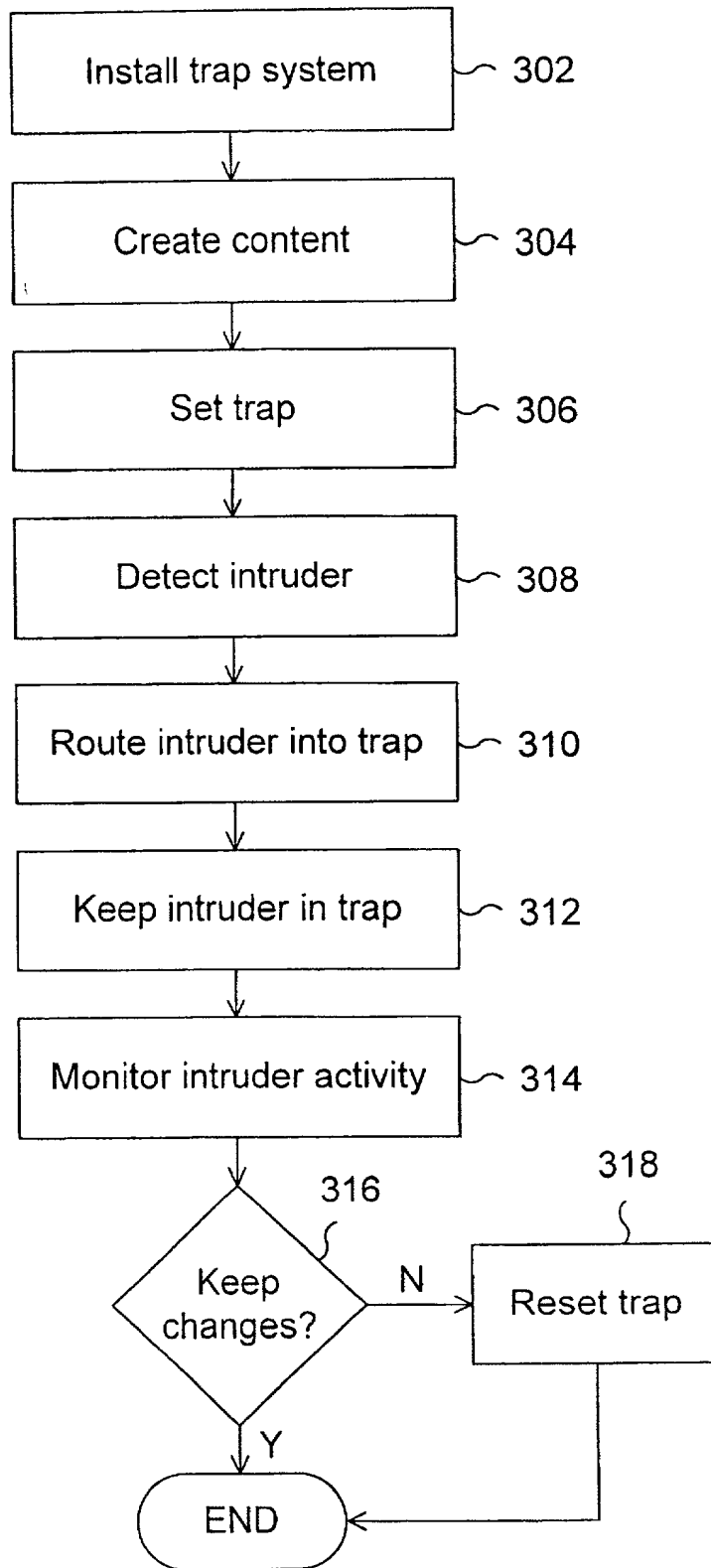


Figure 3

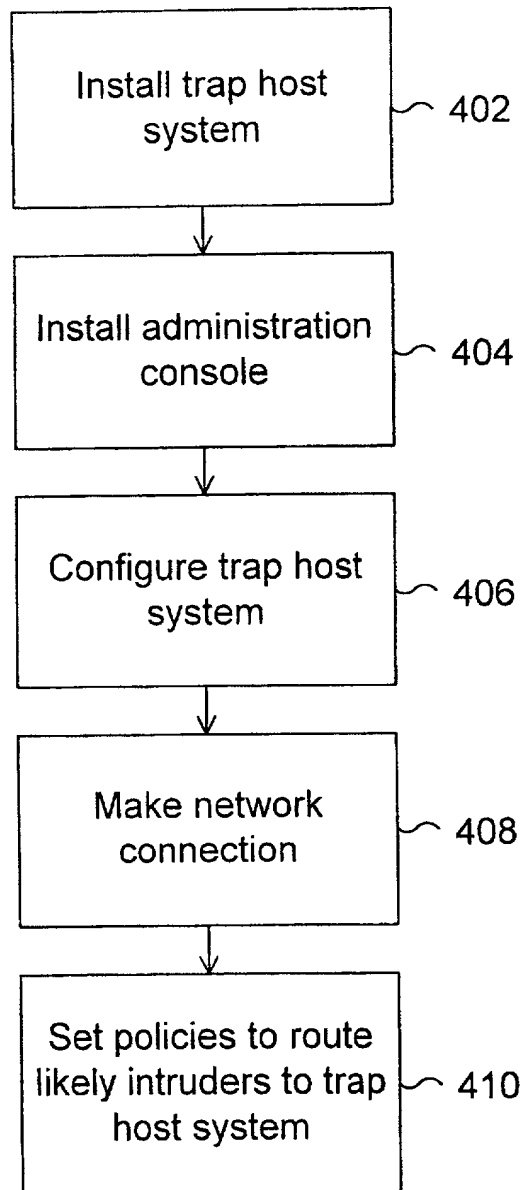


Figure 4

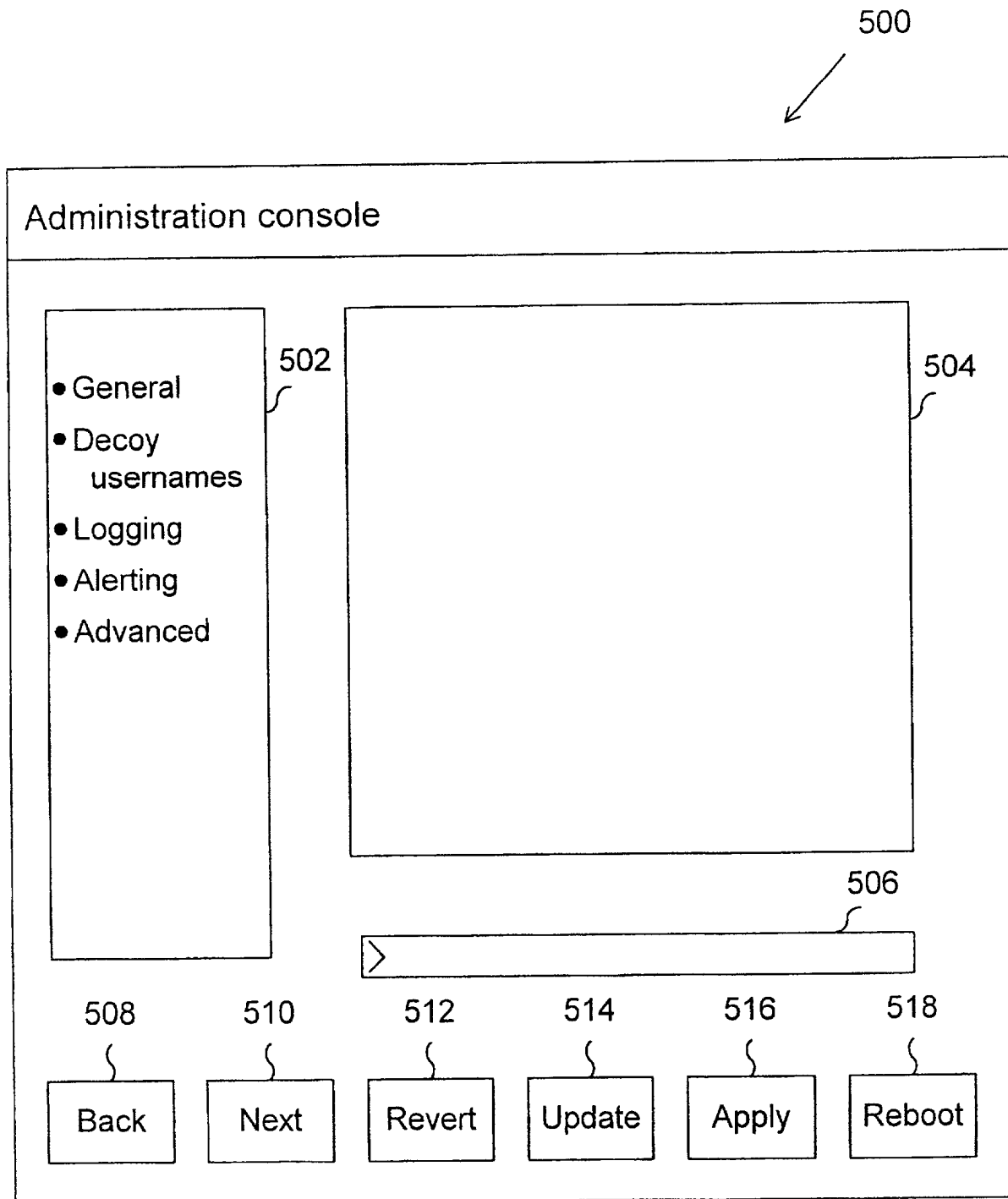


Figure 5

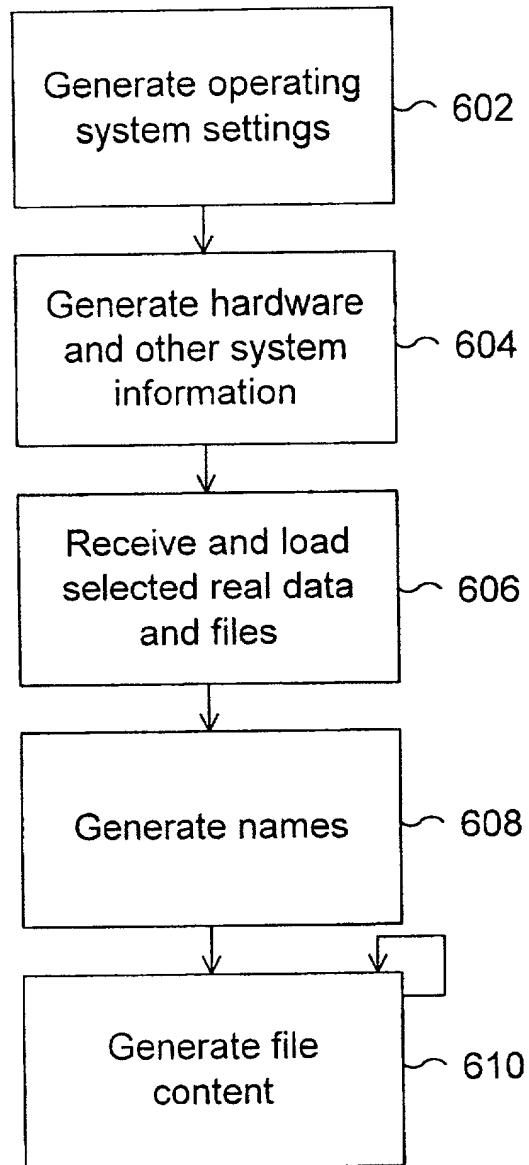


Figure 6

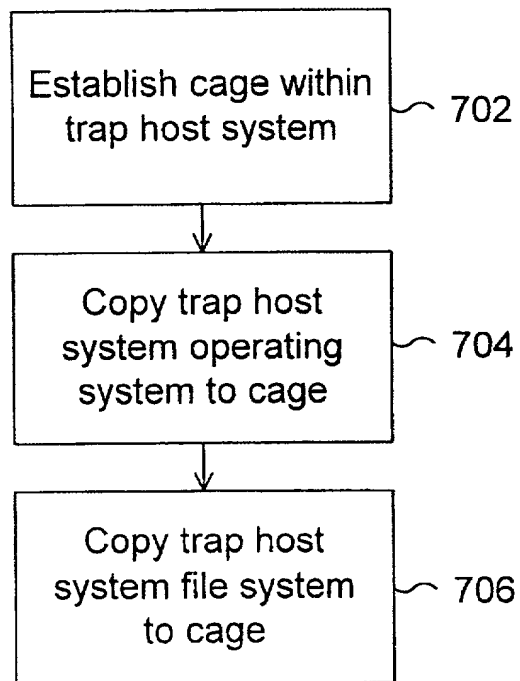


Figure 7

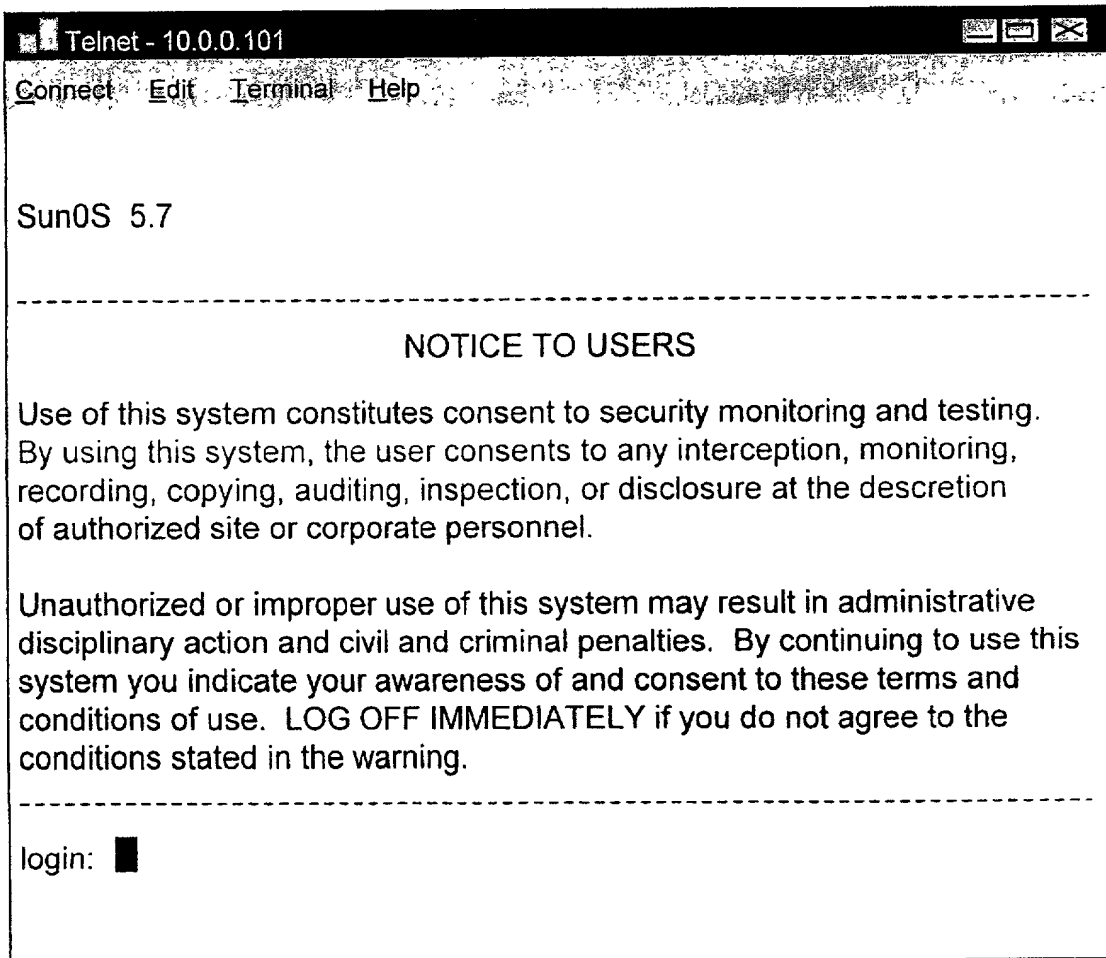


Figure 8



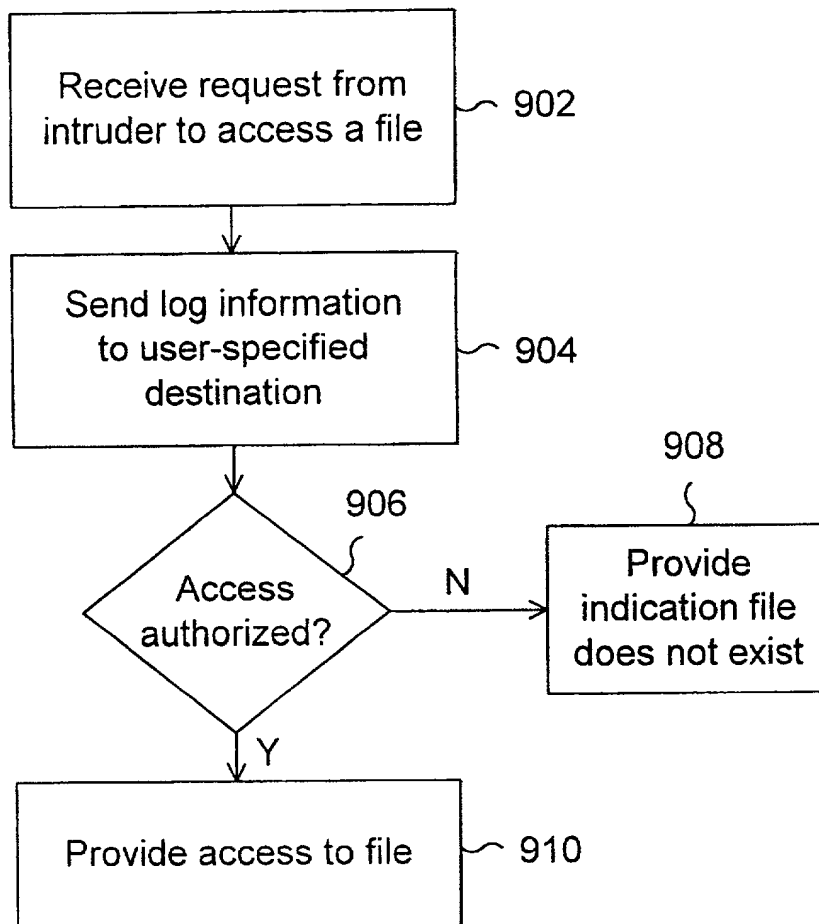


Figure 9

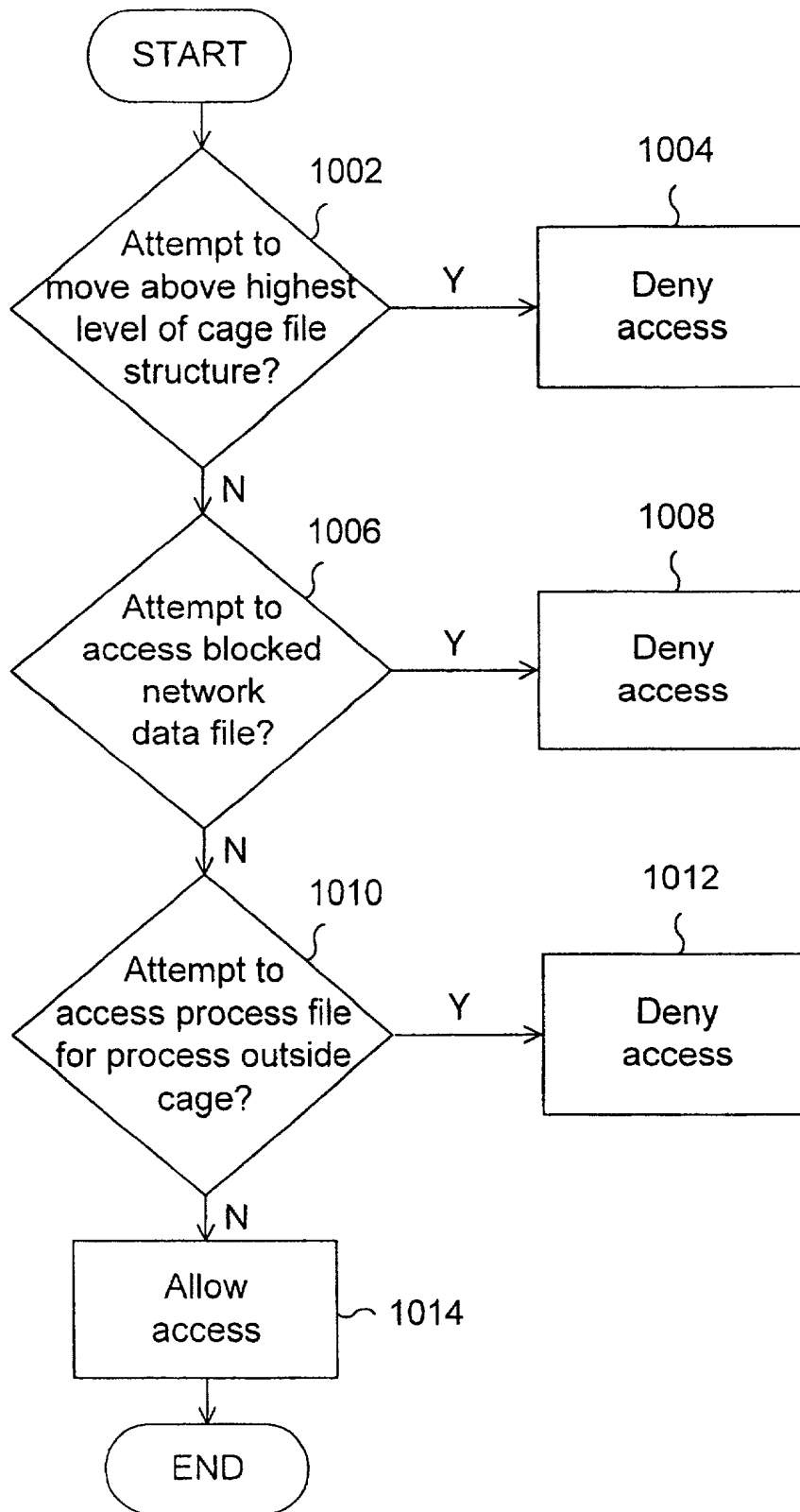


Figure 10

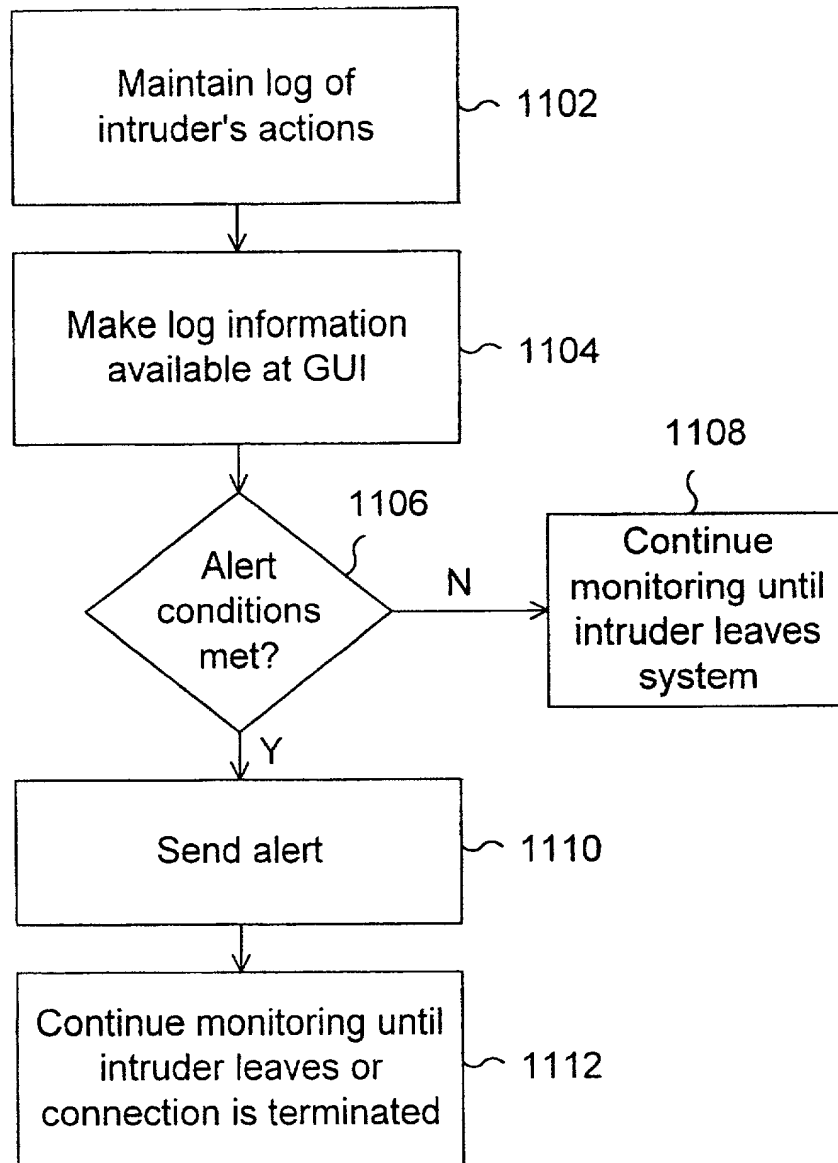


Figure11A

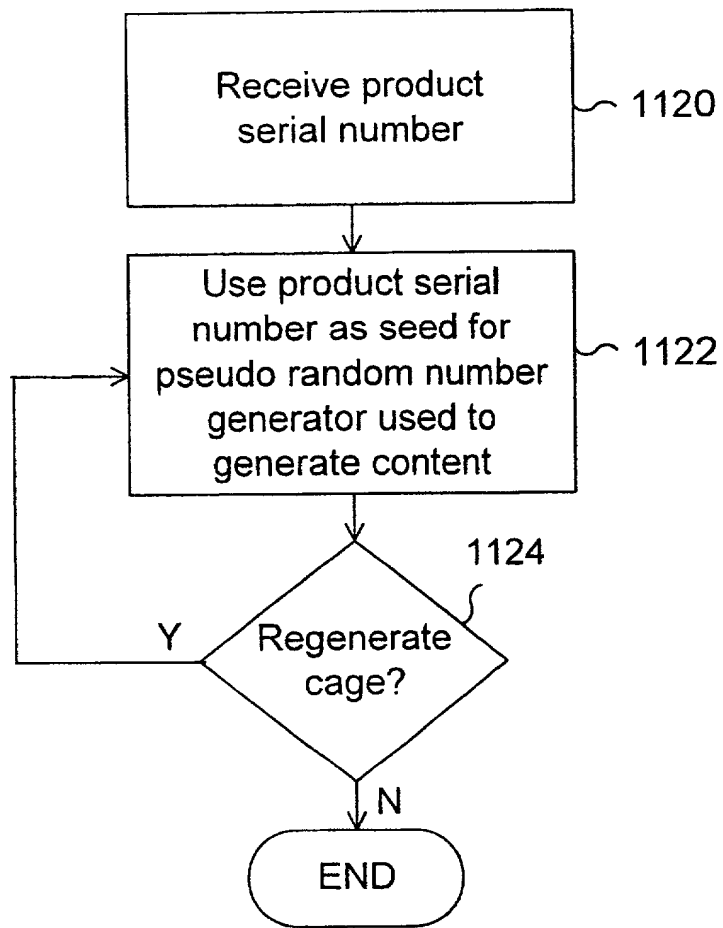


Figure 11B

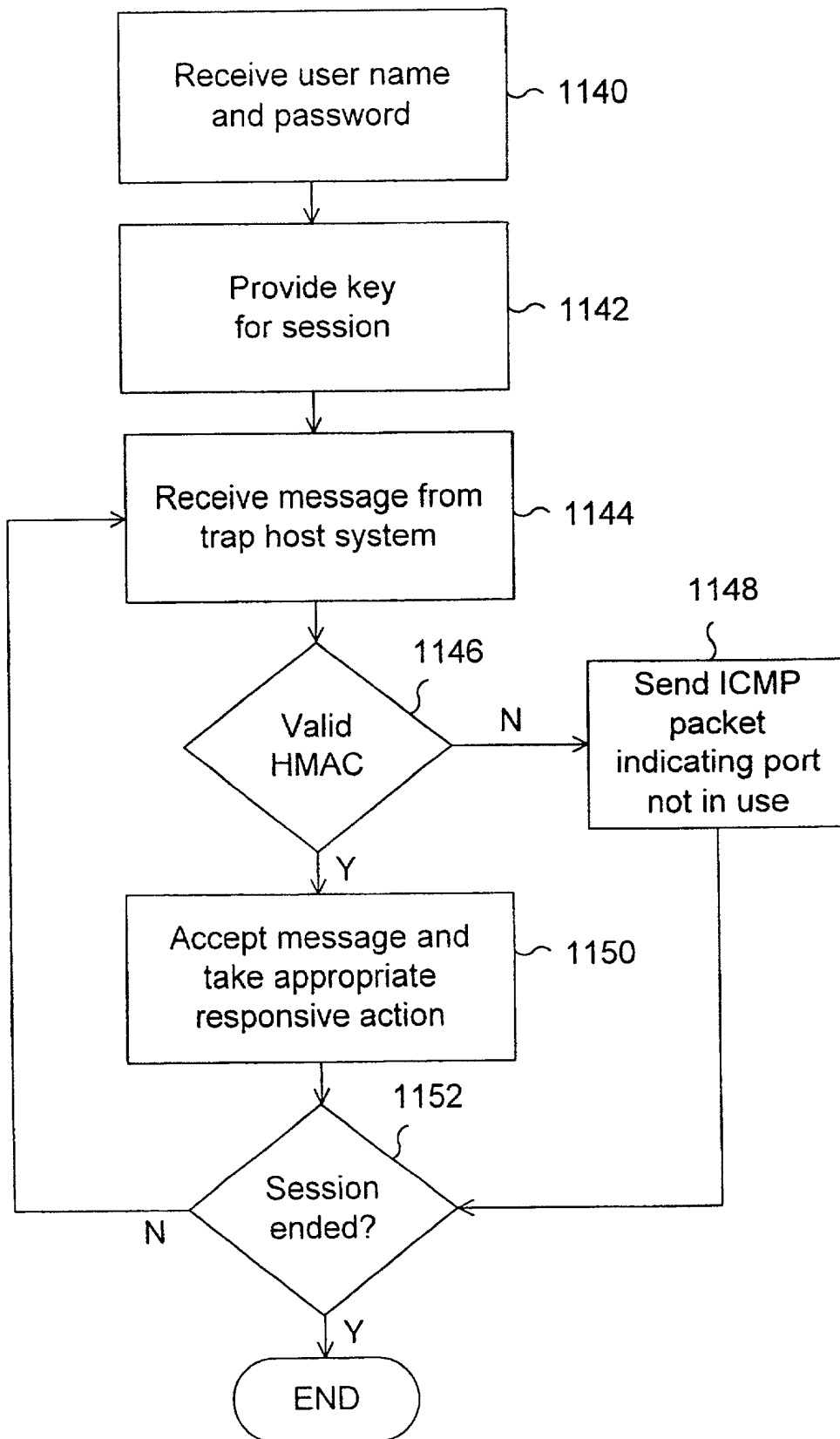


Figure 11C

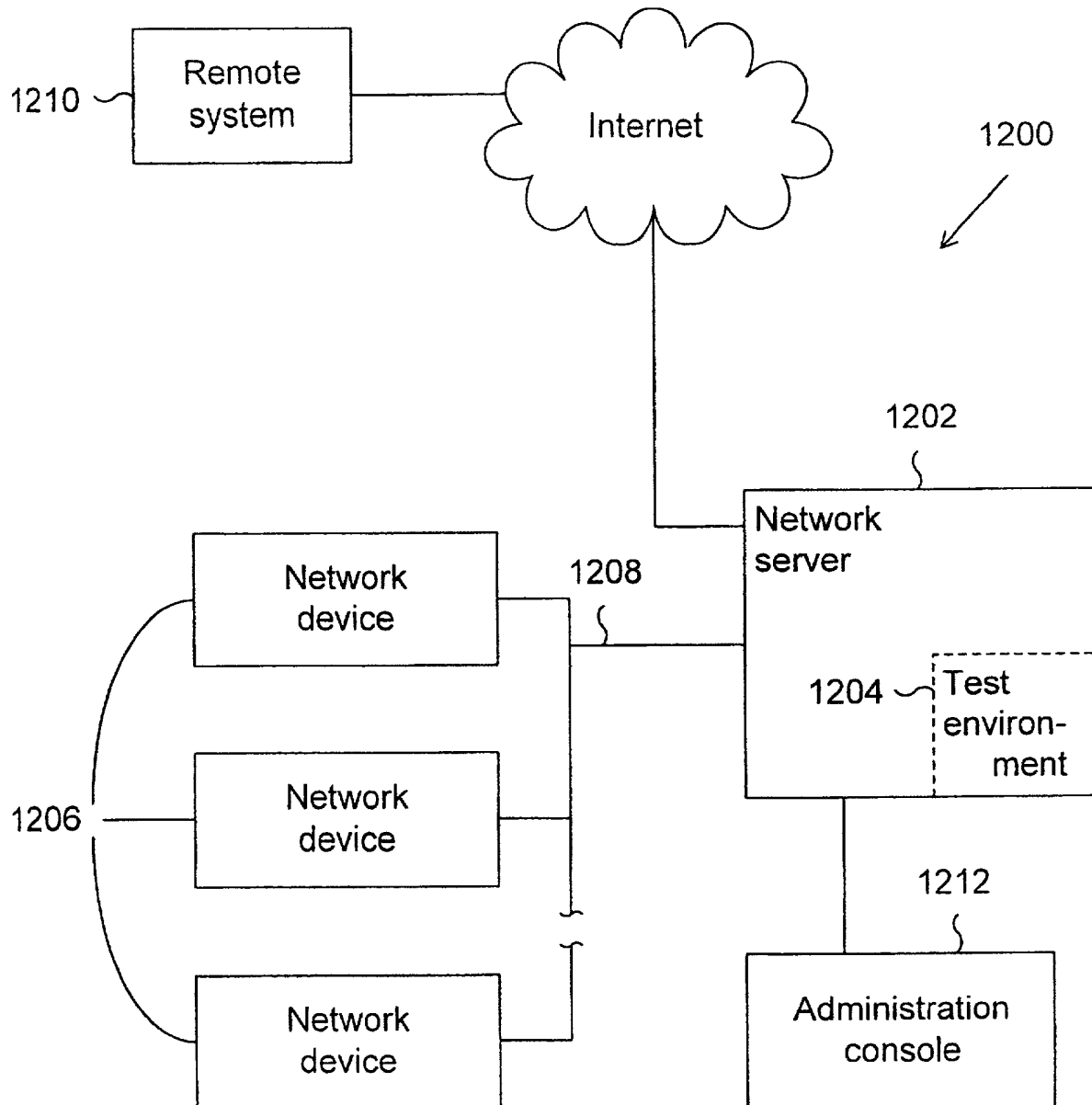


Figure 12

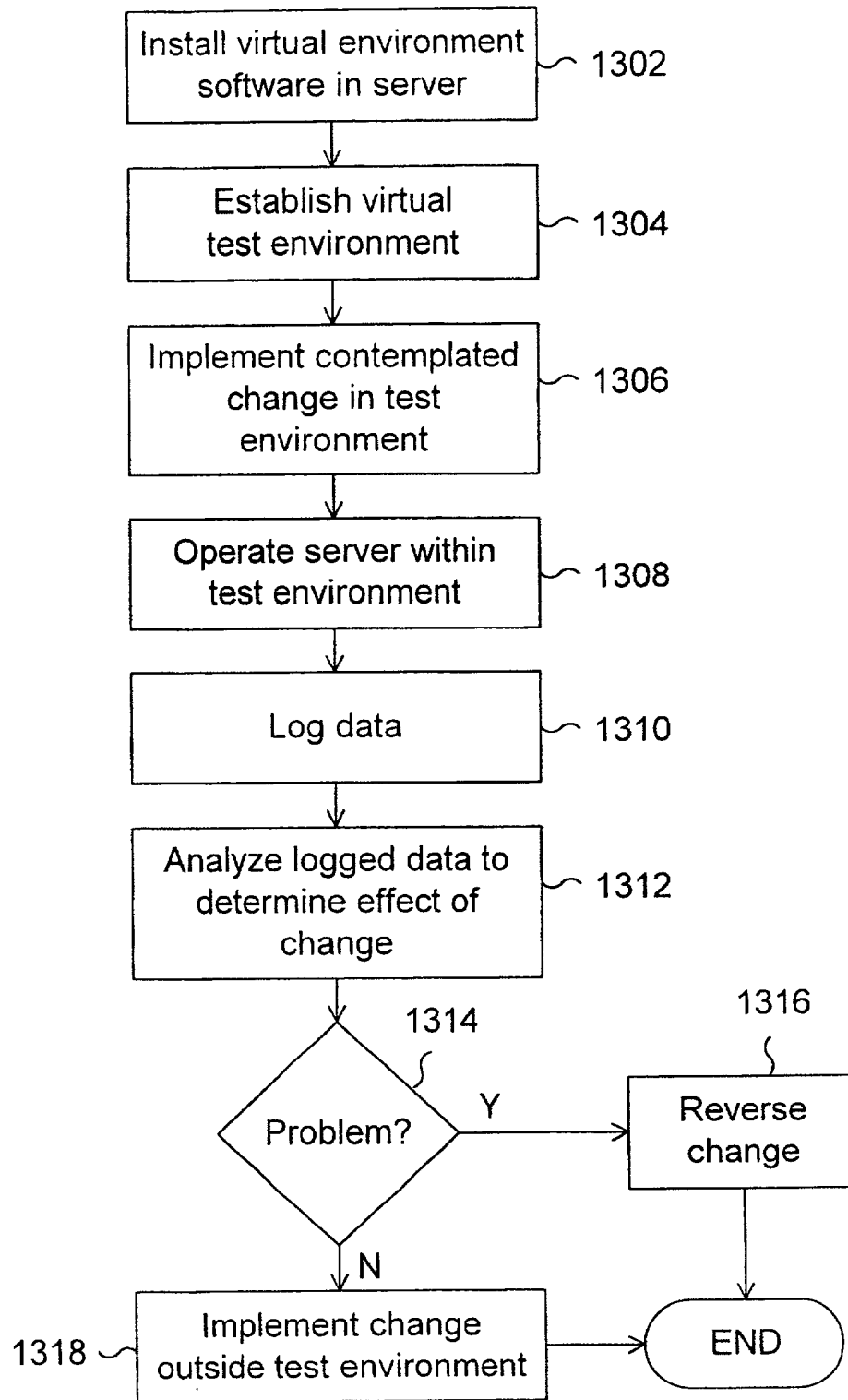


Figure 13

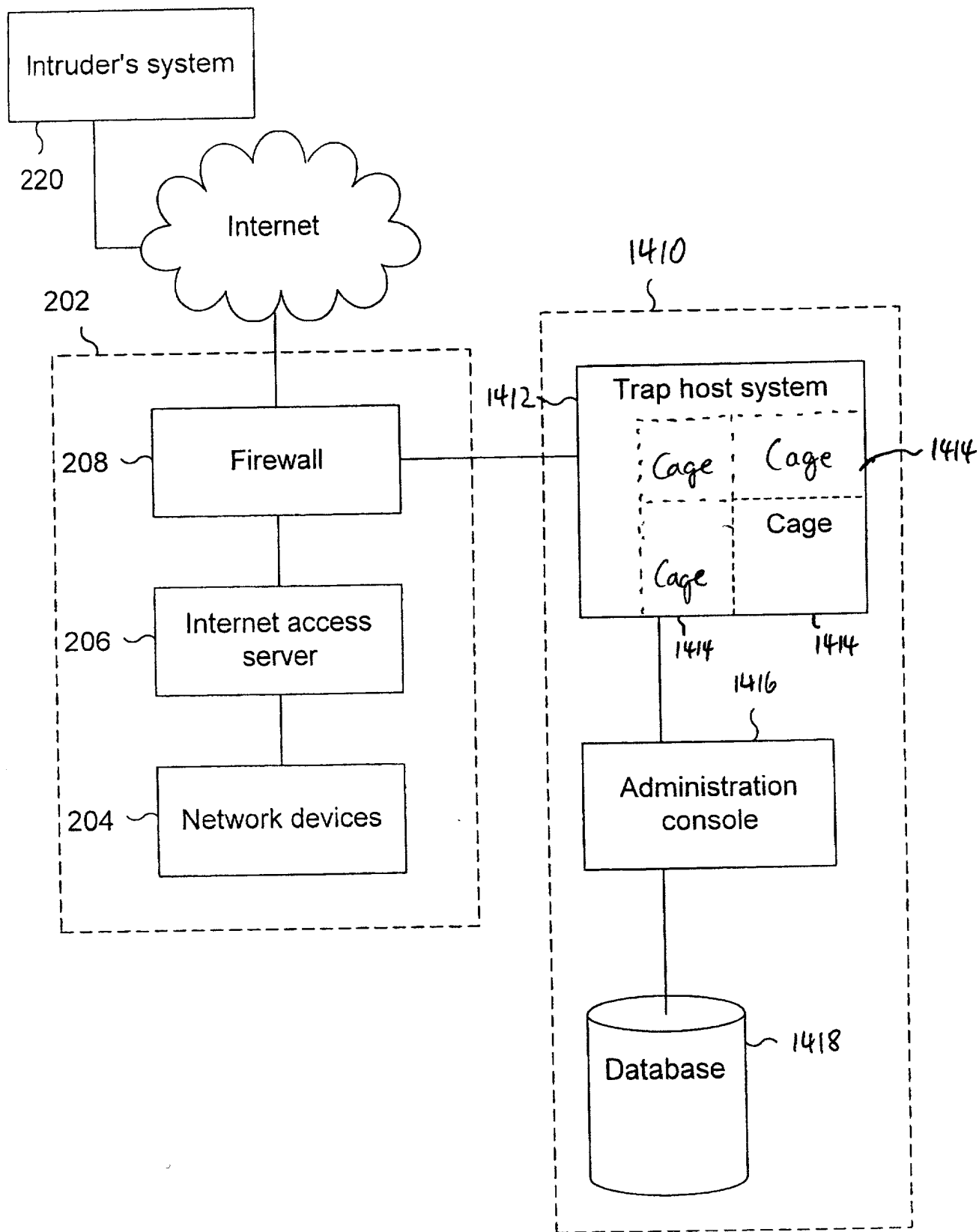


Figure 14



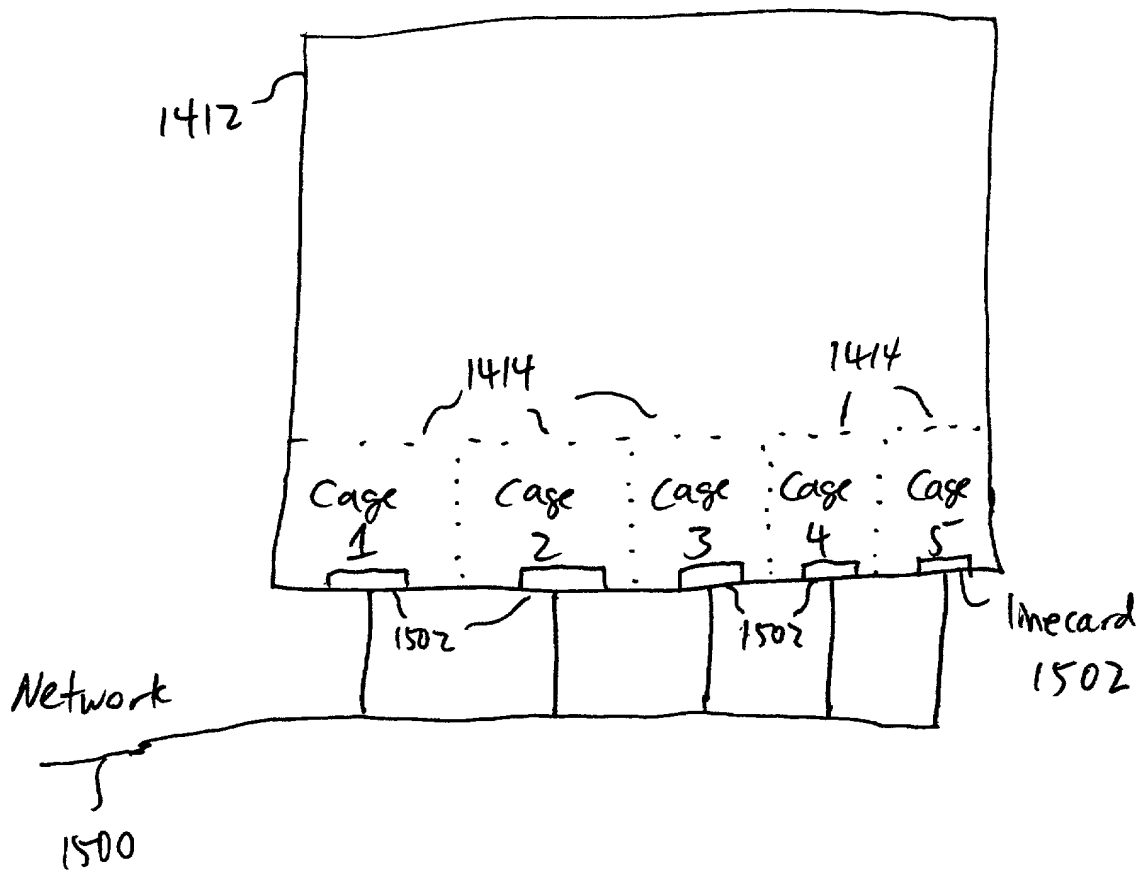


Figure 15

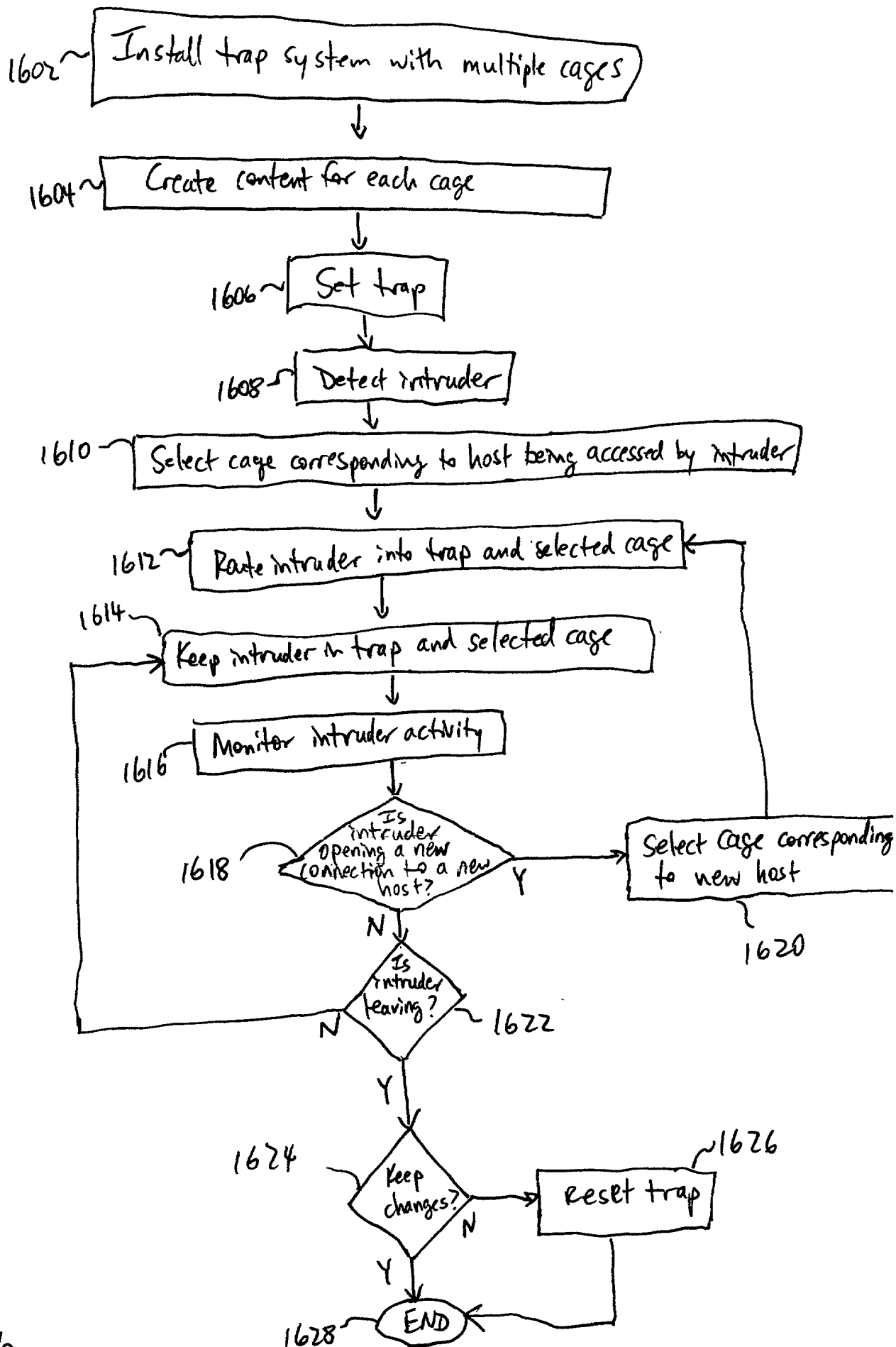


FIGURE 16

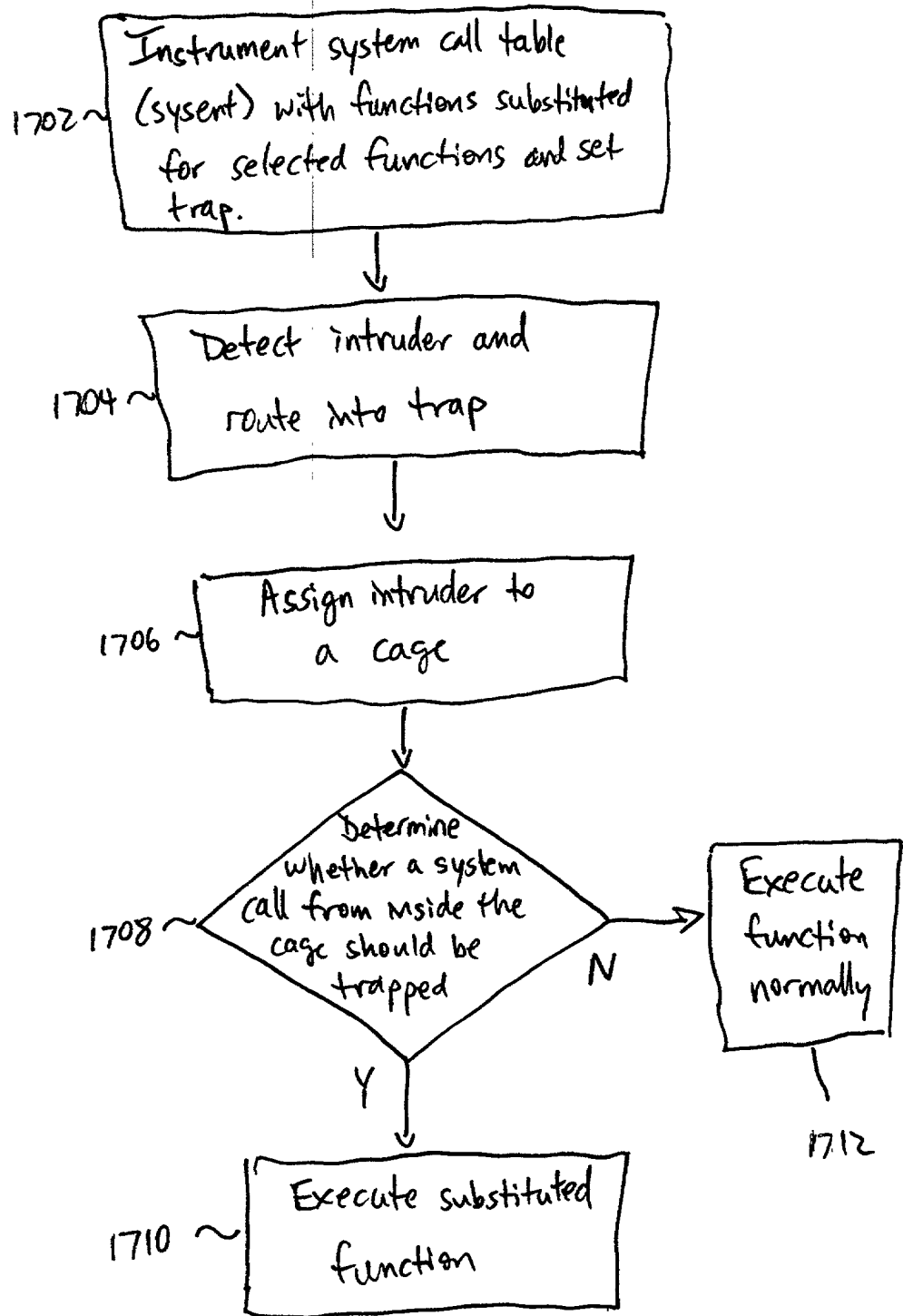


Figure 17

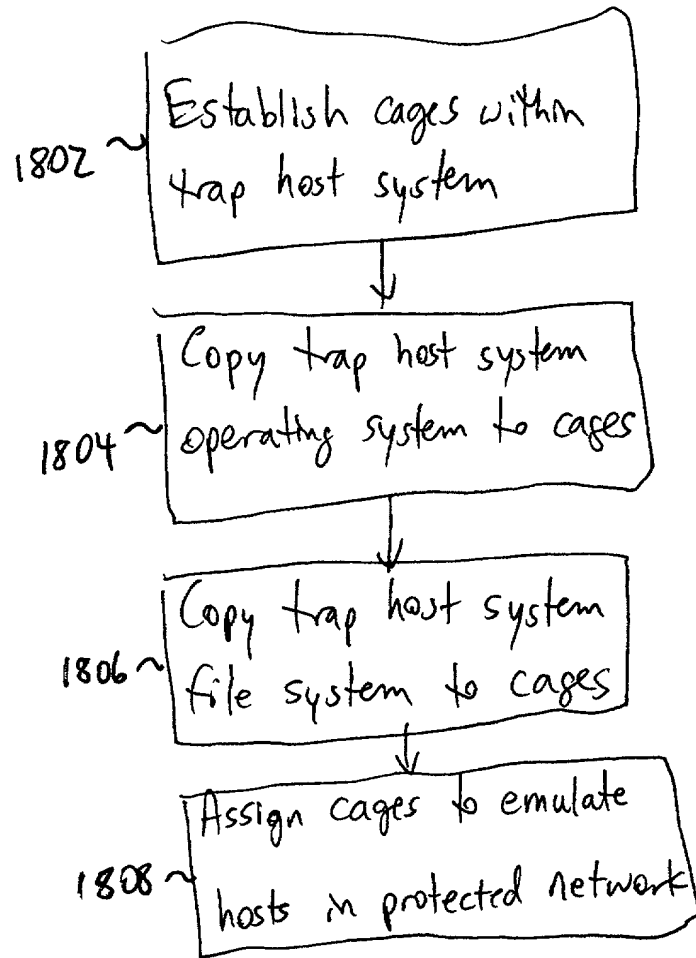


Figure 18

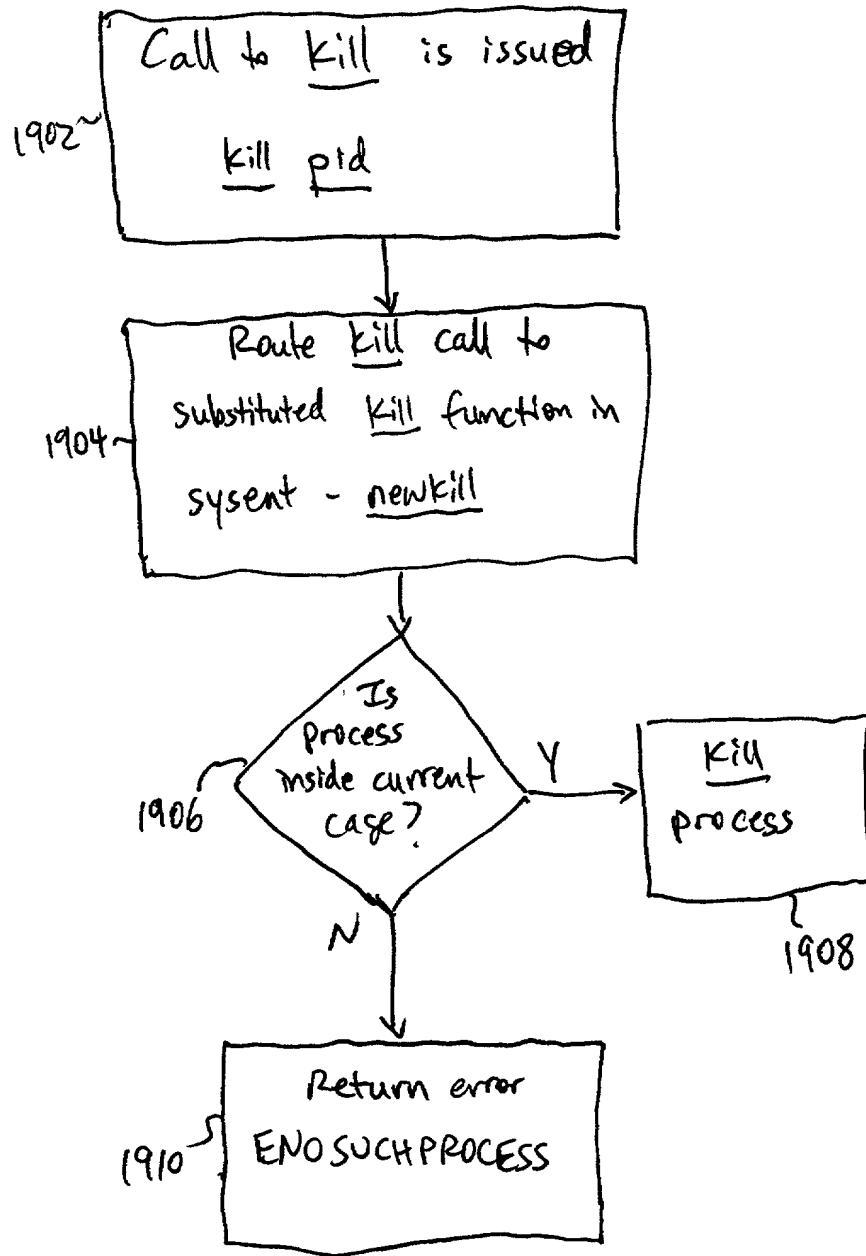


Figure 19

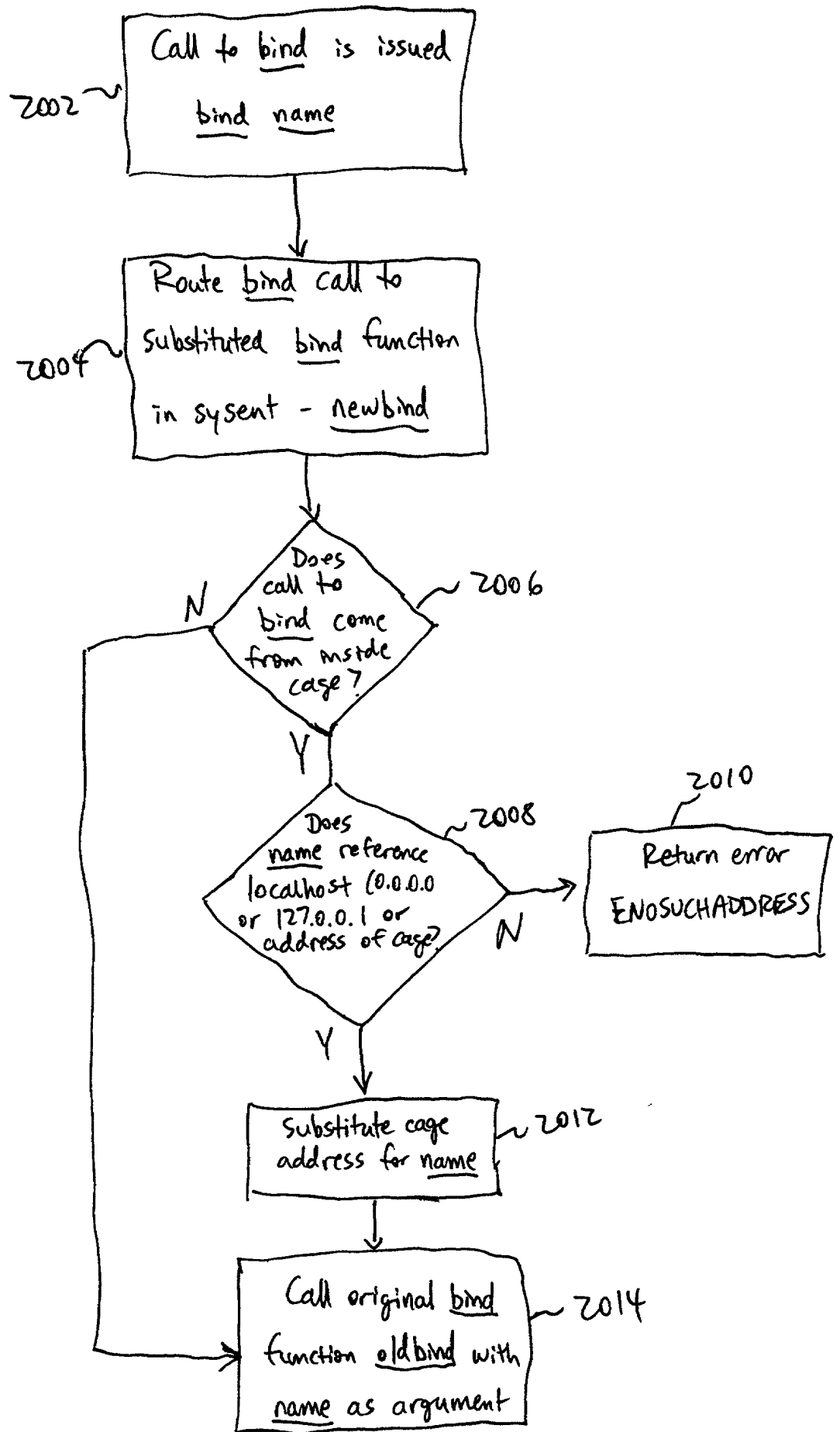


Figure 20

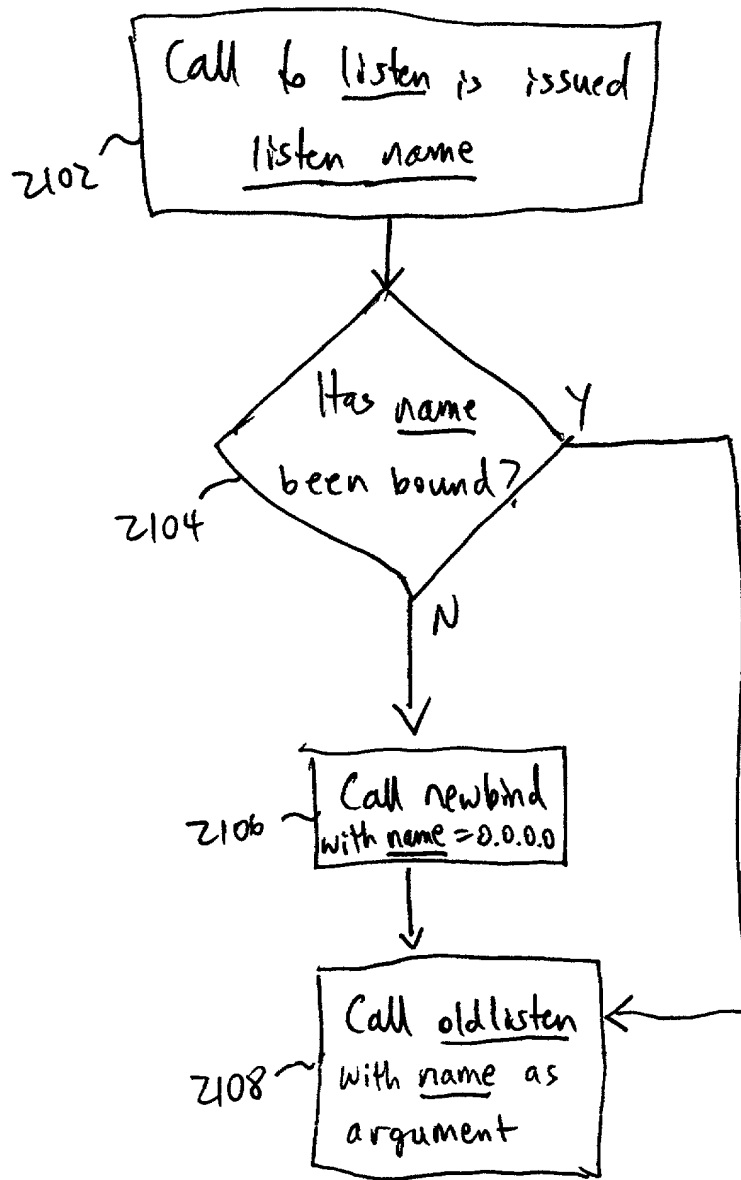


Figure 21

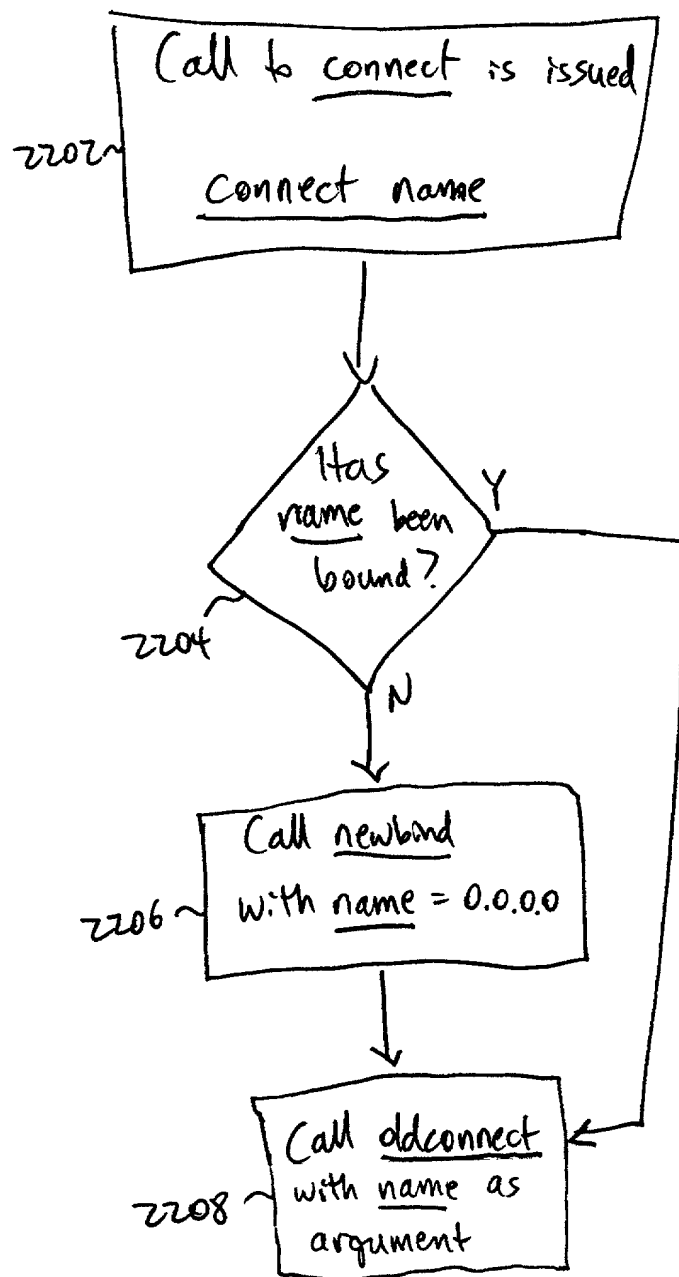


Figure 22



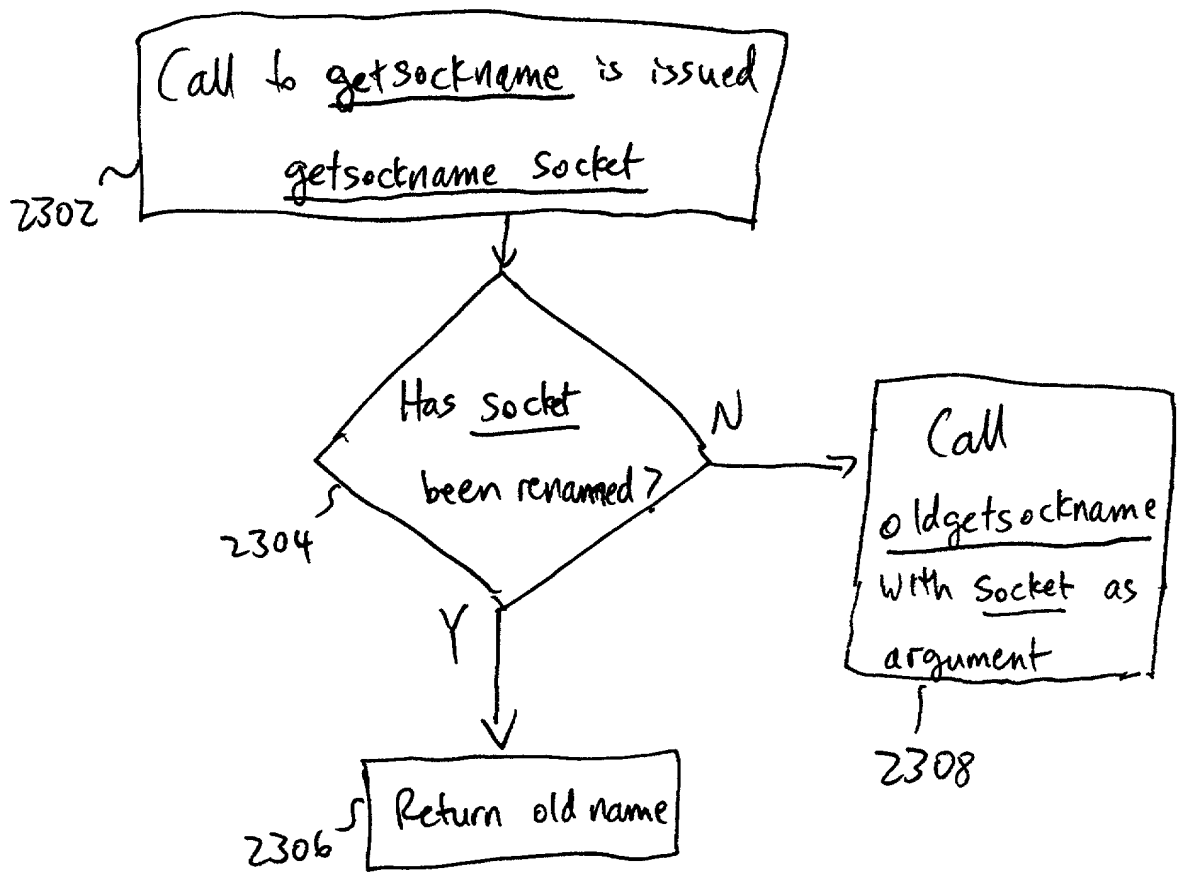


Figure 23

2402~ Call to ioctl is issued  
ioctl cmd, fd

2404~ Route ioctl call to  
substituted ioctl call in  
sysent - newioctl

2406~ Use fd to determine type  
of fs and use appropriate  
method

2408~ Extract cmd from call  
to ioctl and execute the  
corresponding function in  
newioctl

If cmd is getnumif  
(actually SIOCGIFNUM),  
return 2

2410

If cmd is getifconfig,  
return (hme0, lo0)

2412

If cmd is getifaddr (name, such  
as hme0) call oldioctl with  
name of corresponding real device,  
such as gfe2. If getifaddr call  
references a device not in the cage,  
return error.

2414

Figure 24

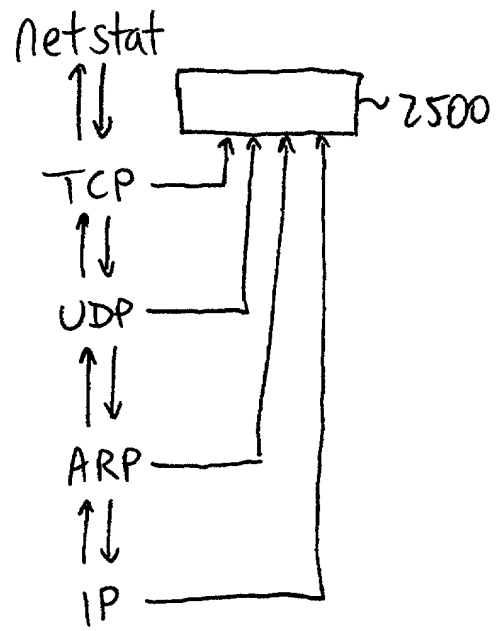


Figure 25

```

<doc>
<regexp-query>
  <name>Possible SGID Exploit</name>
  <properties>
    <priority>10</priority>
  </properties>
  <pattern>
    <next>
      <line>.*exec args=.*pid=\((\d+)\); ppid=\(\d+\); uid=\(\d+\); euid=
\(\d+\); gid=\([1-9]\d*\); egid=\(0\).*</line>
    </next>
    <next>
      <line>.*args=\([^\-\\w\\\/ ]+\); pid=\(\d+\); ppid=\(%1%\).*</line>
    </next>
  </pattern>
  <procmatch>
    <actionpair>
      <line>.*args=\([^\-\\w\\\/ ]+\).*ppid=\(%1%\).*</line>
      <action>
        <highlight/>
        <delete/>
        <varop var="agg">%1%</varop>
      </action>
    </actionpair>
  </procmatch>
  <annotation>
    <text>Possible SGID Exploit: %agg%</text>
  </annotation>
</regexp-query>
</doc>

```

Figure 26

```

<doc>
  <regexp-query>
    <name>Possible SUID Exploit</name>
    <properties>
      <priority>10< /priority>
    </properties>
    <pattern>
      <next>
        <line>.*exec args=.*pid=\((\d+)\); ppid=\(\d+\); uid=\([1-9]\d*\);
euid=\(0\).*</line>
      </next>
      <next>
        <line>.*args=\(.+\); pid=\(\d+\); ppid=\(%1%\).*</line>
      </next>
    </pattern>
    <procmatch>
      <actionpair>
        <line>.*args=\(.+\); pid=\(\d+\); ppid=\(%1%\).*</line>
        <action>
          <highlight/>
          <delete/>
          <varop var="agg">%1%</varop>
        </action>
      </procmatch>
      <annotation>
        <text>Possible SUID Exploit: %agg%</text>
      </annotation>
    </regexp-query>
  </doc>

```

Figure 27

```

<doc>
<regexp-query>
  <name>All Processes</name>
  <properties>
    <priority>10</priority>
  </properties>
  <pattern>
    <next>
      <line>.*proclog.*args=\(((\\-\\.\\w\\\\/ ]+)\)).*</line>
    </next>
  </pattern>
  <procmatch>
    <actionpair>
      <line>.*args=\(((\\-\\.\\w\\\\/ ]+)\)).*</line>
      <action>
        <highlight/>
        <delete/>
        <varop var="agg">%1%</varop>
      </action>
    </actionpair>
  </procmatch>
  <annotation>
    <text>Process started: %agg%</text>
  </annotation>
</regexp-query>
</doc>

```

Figure 28

```

<doc>
<regex-query>
  <name>Find Processes...</name>
  <properties>
    <priority>10</priority>
  </properties>
  <args>
    <args>.</args>
    <pid>\d+</pid>
    <ppid>\d+</ppid>
    <uid>\d+</uid>
    <euid>\d+</euid>
    <gid>\d+</gid>
    <egid>\d+</egid>
  </args>
  <pattern>
    <next>
      <line>.*args=\(%args%\); pid=\(%pid%\); ppid=\(%ppid%\);
uid=\(%uid%\); euid=\(%euid%\); gid=\(%gid%\); egid=\(%egid%\).*</line>
    </next>
  </pattern>
  <procmatch>
    <actionpair>
      <line>.*args=\((.+)\); pid.*</line>
      <action>
        <highlight/>
        <delete/>
        <varop var="agg">%1%</varop>
      </action>
    </actionpair>
  </procmatch>
  <annotation>
    <text>Process started: %agg%</text>
  </annotation>
</regex-query>
</doc>

```

Figure 29

```

<doc>
<regex-query>
  <name>All Shell-spawned Processes</name>
  <properties>
    <priority>l0</priority>
  </properties>
  <pattern>
    <next>
      <line>.*exec args=\(-sh\); pid=\(((\d+)\)).*</line>
    </next>
    <next>
      <line>.*args=\(((\[-\w\\\/ ]+)\)).*ppid=\(%l%\).*</line>
    </next>
  </pattern>
  <procmatch>
    <actionpair>
      <line>.*args=\(((\[-\w\\\/ ]+)\)).*ppid=\(%l%\).*</line>
      <action>
        <highlight/>
        <varop var="agg">%l%</varop>
      </action>
    </actionpair>
  </procmatch>
  <annotation>
    <text>Executed from a shell: %agg%</text>
  </annotation>
</regex-query>
</doc>

```

Figure 30



```

<doc>
<regexp-query>
  <name>Incoming Connections</name>
  <properties>
    <priority>l0</priority>
  </properties>
  <pattern>
    <next>
      <line>.*incoming connection from=\(.+\).*</line>
    </next>
  </pattern>
  <procmatch>
    <actionpair>
      <line>.*incoming connection from=\((.+):(.+)\)</line>
to=\((.+):(.+)\).*</line>
      <action>
        <highlight/>
        <delete/>
        <varop var= "fromip">%1%</varop>
        <varop var= "fromport">%2%</varop>
        <varop var= "toip">%3%</varop>
        <varop var= "toport">%4%</varop>
      </action>
    </actionpair>
  </procmatch>
  <annotation>
    <text>Incoming Connection From IP: %fromip% (on port: %fromport%) To
IP: %toip% (on port: %toport%)</text>
  </annotation>
</regexp-query>
</doc>

```

Figure 31

```

<doc>
<regexp-query>
  <name>Keystrokes Entered</name>
  <properties>
    <priority>10</priority>
  </properties>
  <pattern>
    <next>
      <line>.*read stream data, id=\(((\d+)\)) data=\(.+\).*</line>
    </next>
    <next fromprev="1">
      <line>.*read stream data, id=\(%1%\) data=\(.*\0[ad4].*\).*</line>
    </next>
  </pattern>
  <procmatch>
    <actionpair>
      <line>.*read stream data, id=\(%1%\) data=\(((+)\)).*</line>
      <action>
        <highlight/>
        <delete/>
        <varop var="agg">%1%</varop>
      </action>
    </actionpair>
  </procmatch>
  <annotation>
    <text>Keystrokes Entered: %agg%</text>
  </annotation>
</regexp-query>
</doc>

```

Figure 32

```

<doc>
<regex-query>
  <name>Screen Output</name>
  <properties>
    <priority>10</priority>
  </properties>
  <pattern>
    <next>
      <line>.*write stream data, id=\((\d+)\) data=\(.+\).*</line>
    </next>
    <next fromprev="1">
      <line>.*write stream data, id=\(%1%\)
data=\(.*\[ad46].*\).*</line>
    </next>
  </pattern>
  <procmatch>
    <actionpair>
      <line>.*write stream data, id=\(%1%\) data=\(.+\).*</line>
      <action>
        <highlight/>
        <delete/>
        <varop var="agg">%1%</varop>
      </action>
    </actionpair>
  </procmatch>
  <annotation>
    <text>Output to screen: %agg%</text>
  </annotation>
</regex-query>
</doc>

```

Figure 33

```

<doc>
<regex-query>
  <name>Find Monitored</name>
  <properties>
    <priority>10</priority>
  </properties>
  <args>
    <file_name>.+</file_name>
    <pid>\d+</pid>
  </args>
  <pattern>
    <next>
      <line>.*monitored file opened name=\(%file_name%\)
pid=\(%pid%\).*</line>
    </next>
    </pattern>
    <procmatch>
      <actionpair>
        <line>.*monitored file opened name=\(%file_name%\)
pid=\(%pid%\).*</line>
        <action>
          <highlight/>
          <delete/>
          <varop var="filename">%1%</varop>
          <varop var="pidvar">%2%</varop>
        </action>
      </actionpair>
    </procmatch>
    <annotation>
      <text>File Opened: %filename% (from pid: %pidvar%)</text>
    </annotation>
  </regex-query>
</doc>

```

Figure 34